New Hampshire Volunteer Lake Assessment Program

2003 Biennial Report for Lake Winnisquam Belmont

NHDES
Water Division
Watershed Management Bureau
29 Hazen Drive
Concord, NH 03301

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **LAKE WINNISQUAM (Mohawk Island, Pot Island, Three Islands),** the program coordinators have made the following observations and recommendations:

We would like to thank the three monitoring groups for sampling each deep spot at least once this summer. However, we would like to encourage each monitoring group to sample additional times each summer. Typically we recommend that monitoring groups sample three times per summer (once in June, July, and August). We understand that the number of sampling events you decide to conduct per summer will depend upon volunteer availability, your monitoring group's water monitoring goals and funding availability. However, with a limited amount of data it is difficult to determine accurate and representative water quality trends. Since weather patterns and activity in the watershed can change throughout the summer, from year to year, and even from hour to hour during a rain event, it is a good idea to sample the lake/pond at least once per month over the course of the season.

If you are having difficulty finding volunteers to help sample, or to pick-up or drop-off equipment at one of the laboratories, please give the VLAP Coordinator a call and we will try to help you work out an arrangement.

FIGURE INTERPRETATION

- **Figure 1 and Table 1:** The graphs in Figure 1 (Appendix A) show the historical and current year chlorophyll-a concentration in the water column. Table 1 (Appendix B) lists the maximum, minimum, and mean concentration for each sampling season that the lake/pond has been monitored through the program.

  Chlorophyll-a, a pigment naturally found in plants, is an indicator of the algal abundance. Because algae are usually microscopic plants that contain chlorophyll-a, and are naturally found in lake ecosystems, the chlorophyll-a concentration measured in the water gives an estimation of the algal concentration or lake productivity.

The mean (average) summer chlorophyll-a concentration for New Hampshire's lakes and ponds is 7.02 ug/L.
THREE ISLANDS

The current year data (the top graph) show that the chlorophyll-a concentration in August was ***much less than*** the state mean.

Overall, visual inspection of the historical data trend line (the bottom graph) shows ***a relatively stable*** in-lake chlorophyll-a trend. Specifically, since monitoring began in 1987, the chlorophyll has ranged between approximately 1.5 and 3.5 mg/m^3.

Furthermore, statistical analysis of the historical data (the bottom graph) shows that the mean annual chlorophyll-a concentration did ***not significantly change*** (either *continually increased* or *decreased*) during the sampling period 1987 – 1998. (Please note that the lake was not sampled in this location in 1999, therefore, it was not possible to conduct a statistical analysis of the data from 1987 to 2003. In order to conduct a statistical analysis, there must be at least ten *consecutive* years of sampling data. Please refer to Appendix E for the detailed statistical analysis explanation and data print out.)

POT ISLAND

The current year data (the top graph) show that the chlorophyll-a concentration ***increased slightly*** from July to August. The chlorophyll concentration on both sampling events was ***much less than*** the state mean.

Overall, visual inspection of the historical data trend line (the bottom graph) shows ***a relatively stable*** in-lake chlorophyll-a trend. Specifically, since monitoring began in 1987, the chlorophyll has ranged between approximately 1.5 and 3.5 mg/m^3.

Overall, the statistical analysis of the historical data show that the chlorophyll-a concentration has ***remained relatively stable*** since monitoring began in 1987. However, visual inspection of the historical data suggests that the chlorophyll concentration has ***slightly decreased*** (meaning ***slightly improved***) since 1987. If the concentration continues to decrease each season, the decrease may soon become statistically significant. (Note: Please refer to Appendix E for the detailed statistical analysis explanation and data print out.) We hope this trend continues!

MOHAWK ISLAND

The current year data (the top graph) show that the chlorophyll-a concentration in August was ***much less than*** the state mean.

Overall, visual inspection of the historical data trend line (the bottom graph) shows an ***overall stable*** in-lake chlorophyll-a trend. Aside from the data collected in 1991 and 1995, the chlorophyll concentration has ranged between approximately 1.5 and 3.5 mg/m^3.

Furthermore, statistical analysis of the historical data (the bottom graph) shows that the mean annual chlorophyll-a concentration did ***not significantly change*** (either *continually increased* or *decreased*) during the sampling period 1987 – 1998. (Please note that the lake was not sampled in this location in 1999, therefore, it was not possible to conduct a statistical analysis of the data from 1987 – 2003. As discussed previously, in order to conduct a statistical analysis, there must be at least ten *consecutive* years of sampling data. Please refer to Appendix E for the detailed statistical analysis explanation and data print out.)

OVERALL SUMMARY

It is important to point out that, overall, the chlorophyll concentration at each of the three deep spots has been ***much less than*** the state mean, and has been relatively stable since monitoring began in 1987.

- **Figure 2 and Table 3:** The graphs in Figure 2 (Appendix A) show historical and current year data for lake/pond transparency. Table 3 (Appendix B) lists the maximum, minimum and mean transparency data for each sampling season that the lake/pond has been monitored through the program.

  Volunteer monitors use the Secchi-disk, a 20 cm disk with alternating black and white quadrants, to measure water clarity (how far a person can see into the water). Transparency, a measure of water clarity, can be affected by the amount of algae and sediment from erosion, as well as the natural colors of the water. **The mean (average) summer transparency for New Hampshire's lakes and ponds is 3.7 meters.**

  THREE ISLANDS

  The current year data (the top graph) show that the in-lake transparency in August was ***much greater than*** the state mean.

  Overall, visual inspection of the historical data trend line (the bottom graph) shows ***a slightly increasing*** **(meaning improving)** trend for in-lake transparency since monitoring began in 1987. We hope this trend continues!

However, statistical analysis of the historical data (the bottom graph) shows that the mean annual chlorophyll-a concentration did ***not significantly change*** (either *continually increased* or *decreased*) during the sampling period 1987 – 1998. Therefore, it appears that the transparency may have slightly increased since 2000. (Please note that the lake was not sampled in this location in 1999, therefore, it was not possible to conduct a statistical analysis of the data from 1987 – 2003.) If the lake is sampled in this location each year until 2009, we will be able to conduct another statistical analysis of the data to determine if the mean annual transparency has changed since 2000.

POT ISLAND

The current year data (the top graph) show that the in-lake transparency ***decreased*** from July to August. The transparency on both sampling events was ***much greater than*** the state mean.

It is important to point out that as the chlorophyll ***decreased*** from July to August at this station, the transparency ***increased***. We generally expect this ***inverse*** relationship in lakes. As the concentration of algal cells in the water column decreases, the ability of light to penetrate into the water column typically increases.

Overall, the statistical analysis of the historical data show that the mean annual in-lake transparency has ***significantly increased*** since monitoring began. Specifically, the transparency has ***increased*** (meaning ***improved***) on average by ***approximately 0.7 percent*** per sampling season during the sampling period **1987** to **2003**. (Note: Please refer to Appendix E for the statistical analysis explanation and data print out.) We hope this trend continues!

MOHAWK ISLAND

The current year data (the top graph) show that the in-lake transparency in August was ***slightly greater than*** the state mean.

Overall, visual inspection of the historical data trend line (the bottom graph) shows ***a relatively stable*** trend for in-lake transparency since monitoring began in 1987.

OVERALL SUMMARY

It is important to point out that, overall, the transparency at each of the three deep spots has been greater than the state mean since monitoring began, and has slightly increased, particularly at the Pot Island deep spot, since 1987.

- **Figure 3 and Table 8:** The graphs in Figure 3 (Appendix A) show the amounts of phosphorus in the epilimnion (the upper layer) and the hypolimnion (the lower layer); the inset graphs show current year data. Table 8 (Appendix B) lists the annual maximum, minimum, and median concentration for each deep spot layer and each tributary since the lake/pond has joined the program.

  Phosphorus is the limiting nutrient for plant and algae growth in New Hampshire's freshwater lakes and ponds. Too much phosphorus in a lake/pond can lead to increases in plant and algal growth over time. **The median summer total phosphorus concentration in the epilimnion (upper layer) of New Hampshire's lakes and ponds is 11 ug/L. The median summer phosphorus concentration in the hypolimnion (lower layer) is 14 ug/L.**

  THREE ISLANDS

  The current year data for the epilimnion (the top inset graph) show that the phosphorus concentration in August was ***slightly greater than*** the state median, while the concentration in the hypolimnion (the bottom inset graph) was ***less than*** the state median.

  Overall, visual inspection of the historical data trend line for the epilimnion (upper layer) shows a ***variable, but overall stable,*** phosphorus trend. This means that the concentration has ***fluctuated, but has not continually increased or decreased,*** since monitoring began in 1987.

  In addition, the statistical analysis of the historical data shows that the phosphorus concentration in the hypolimnion (lower layer) ***significantly decrease*****d** during the sampling period 1987 – 1998. Specifically, the phosphorus concentration in the hypolimnion during this period ***decreased*** (meaning ***improved***) on average by ***approximately 5.5 percent*** per sampling season. (Again, please note that the lake was not sampled in this location in 1999, therefore, it was not possible to conduct a statistical analysis of the data from 1987 – 2003.)

  Overall, visual inspection of the historical data trend line for the hypolimnion (lower layer) shows ***a stabilizing trend*** since 1993.

  POT ISLAND

  The current year data for the epilimnion (the top inset graph) show that the phosphorus concentration ***remained stable*** from July to August. The phosphorus concentration on each sampling event was ***much less than*** the state median.

The current year data for the hypolimnion (the bottom inset graph) show that the phosphorus concentration ***increased slightly*** from July to August. The phosphorus concentration on both sampling events was ***less than*** the state median.

Overall, the statistical analysis of the historical data show that the phosphorus concentration in the epilimnion (upper layer) and the hypolimnion (lower layer) has ***significantly decrease*d** since monitoring began in 1987. Specifically, the phosphorus concentration in the epilimnion has ***decreased*** (meaning ***improved***) on average by ***approximately 2.5 percent*** per sampling season. The phosphorus concentration in the hypolimnion has ***decreased*** (meaning ***improved***) on average by ***approximately 2.9 percent*** per sampling season.

MOHAWK ISLAND

The current year data show that the phosphorus concentration in the epilimnion (the top inset graph) was ***less than*** the state median in August, and the phosphorus concentration in the hypolimnion was ***greater than*** the state median.

Overall, visual inspection of the historical data trend line for the epilimnion shows ***a relatively stable*** phosphorus trend since monitoring began in 1987.

Overall, visual inspection of the historical data trend line for the hypolimnion shows ***a variable*** phosphorus trend, which means that the concentration has ***fluctuated*** since monitoring began in 1987.

OVERALL SUMMARY

It is important to point out that the phosphorus concentrations in the epilimnion and hypolimnion among three deep spots (except for the hypolimnion at Mohawk Island) have been similar. In addition, the historical phosphorus trends have been similar at each of the deep spots (i.e.; generally stable to slightly decreasing) since monitoring originally began.

However, in the hypolimnion at Mohawk Island (the shallowest of the deep spot stations) the phosphorus concentration has generally been higher than in the hypolimnion at Pot Island or Three Islands, and also has been more variable. This is likely due to the fact that the lake bottom in this location has historically accumulated a high organic load as a result of phosphorus loading from the 1960’s and 1970’s when treated effluent was discharged into the lake. The Mohawk Island station was the site of a mechanical aerator in the

1970's when the lake bloomed annually with cyanobacteria and the hypolimnion area was anoxic throughout the summer months.

TABLE INTERPRETATION

- **Table 2: Phytoplankton**

  Table 2 (Appendix B) lists the current and historic phytoplankton species observed in the lake/pond. The dominant phytoplankton species observed this year were as follows:

  THREE ISLANDS (August): *Anabaena* (a cyanobacteria), *Asterionella* (a diatom), *and Chroococcus* (a green algae).

  POT ISLAND (July): *Dinobryon* (a golden-brown algae), *Tabellaria* (a diatom), *and Anabaena* (a cyanobacteria).

  POT ISLAND (August): *Asterionella* (a diatom), *Staurastrum* (a green algae), *and Dinobryon* (a golden-brown algae).

  MOHAWK ISLAND (August): *Ceratium* (a dinoflagellate), an unidentifiable filamentous cyanobacteria, *and Asterionella* (a diatom).

  Phytoplankton populations undergo a natural succession during the growing season (Please refer to the "Biological Monitoring Parameters" section of this report for a more detailed explanation regarding seasonal plankton succession). Diatoms and golden-brown algae are typical in New Hampshire's less productive lakes and ponds.

  An overabundance of cyanobacteria (previously referred to as blue-green algae) indicates that there may be an excessive total phosphorus concentration in the lake/pond, or that the ecology is out of balance. Some species of cyanobacteria can be toxic to livestock, pets, wildlife, and humans.

  During September of 2003, a few lakes and ponds in the southern portion of the state experienced cyanobacteria blooms. This was likely due to nutrient loading to these waterbodies. As mentioned previously, many weeks during the Spring and Summer of 2003 were rainy, which likely resulted in a large amount of nutrient loading to surface waters.

  The presence of cyanobacteria serves as a reminder of the lake's/pond's delicate balance. Watershed residents should continue to act proactively to reduce nutrient loading into the lake/pond by eliminating fertilizer use on lawns, keeping the lake/pond shoreline natural, re-vegetating cleared areas within the watershed, and properly maintaining septic systems and roads.

In addition, residents should also observe the lake/pond in September and October during the time of fall turnover (lake mixing) to document any algal blooms that may occur. Cyanobacteria (blue-green algae) have the ability to regulate their depth in the water column by producing or releasing gas from vesicles. However, occasionally lake mixing can affect their buoyancy and cause them to rise to the surface and bloom. Wind and currents tend to "pile" cyanobacteria into scums that accumulate in one section of the lake/pond. If a fall bloom occurs, please contact the VLAP Coordinator.

- **Table 4: pH**

  Table 4 (Appendix B) presents the in-lake and tributary current year and historical pH data.

  pH is measured on a logarithmic scale of 0 (acidic) to 14 (basic). pH is important to the survival and reproduction of fish and other aquatic life. A pH below 5.5 severely limits the growth and reproduction of fish. A pH between 6.5 and 7.0 is ideal for fish. The mean pH value for the epilimnion (upper layer) in New Hampshire's lakes and ponds is **6.5**, which indicates that the surface waters in state are slightly acidic. For a more detailed explanation regarding pH, please refer to the "Chemical Monitoring Parameters" section of this report.

  The mean pH at the deep spot this season ranged from **6.22** in the hypolimnion to **6.86** in the epilimnion, which means that the water is ***slightly acidic.*** In addition, when organic matter on the lake bottom is decomposed, acidic by-products are produced, which likely explains the lower pH (higher acidity) in the hypolimnion.

  Due to the presence of granite bedrock in the state and the deposition of acid rain, there is not much that can be done to effectively increase lake/pond pH.

- **Table 5: Acid Neutralizing Capacity**

  Table 5 (Appendix B) presents the current year and historic epilimnetic ANC for each year the lake/pond has been monitored through VLAP.

  Buffering capacity or ANC describes the ability of a solution to resist changes in pH by neutralizing the acidic input to the lake. The mean ANC value for New Hampshire's lakes and ponds is **6.7 mg/L**, which indicates that many lakes and ponds in the state are "highly sensitive" to acidic inputs. For a more detailed explanation, please refer to the "Chemical Monitoring Parameters" section of this report.

The Acid Neutralizing Capacity (ANC) of the epilimnion (the upper layer) ranged from **5.55 mg/L** at Pot Island to **7.20 mg/L** at Three Islands. This data indicates that the lake is ***highly sensitive*** to acidic inputs (such as acid precipitation).

- **Table 6: Conductivity**

  Table 6 (Appendix B) presents the current and historic conductivity values for tributaries and in-lake data. Conductivity is the numerical expression of the ability of water to carry an electric current. The mean conductivity value for New Hampshire's lakes and ponds is **62.1 uMhos/cm**. For a more detailed explanation, please refer to the "Chemical Monitoring Parameters" section of this report.

  The conductivity has ***increased*** in the lake/pond and inlets since monitoring began. Specifically, at Pot Island, the mean annual epilimnetic concentration has ***increased*** (meaning *worsened*) by ***approximately 2.0 percent*** per sampling season during the sampling period **1987** to **2003**. (Note: Please refer to Appendix E for the statistical analysis explanation and data print out.)

  Typically, sources of increased conductivity are due to human activity. These activities include septic systems that fail and leak leachate into the groundwater (and eventually into the tributaries and the lake/pond), agricultural runoff, and road runoff (which contains road salt during the spring snow melt). New development in the watershed can alter runoff patterns and expose new soil and bedrock areas, which could contribute to increasing conductivity. In addition, natural sources, such as iron deposits in bedrock, can influence conductivity.

  It is possible that de-icing materials applied to nearby roadways during the winter months may be increasing the conductivity in the tributaries and in the lake. In New Hampshire, the most commonly used de-icing material is salt (sodium chloride). Therefore, we recommend that the epilimnion at each deep spot and the inlets with elevated conductivity (Collins Brook and Black Brook) be sampled for chloride next season.

  For information and instructions on how to collect chloride samples, please contact the VLAP Coordinator.

- **Table 8: Total Phosphorus**

  Table 8 (Appendix B) presents the current year and historic total phosphorus data for in-lake and tributary stations. Phosphorus is the nutrient that limits the algae's ability to grow and reproduce. Please refer to the "Chemical Monitoring Parameters" section of this

report for a more detailed explanation.
The total phosphorus concentration continued to be ***relatively low*** in the tributaries that were sampled this season. Since the quality of the lake is partially affected by the quality of the streams that flow into it, we hope this trend continues.

- **Table 9 and Table 10: Dissolved Oxygen and Temperature Data**
  Table 9 (Appendix B) shows the dissolved oxygen/temperature profile(s) for the 2003 sampling season. Table 10 (Appendix B) shows the historical and current year dissolved oxygen concentration in the hypolimnion (lower layer). The presence of dissolved oxygen is vital to fish and amphibians in the water column and also to bottom-dwelling organisms. Please refer to the "Chemical Monitoring Parameters" section of this report for a more detailed explanation.

THREE ISLANDS AND POT ISLAND:

On the August sampling event, the dissolved oxygen concentration continued to be ***relatively high*** at all depths sampled at the **THREE ISLANDS** and **POT ISLAND** deep spots. The ***high*** oxygen level in the hypolimnion is a sign of the lake's overall good health in these locations.

MOHAWK ISLAND:

The dissolved oxygen concentration was ***low in the hypolimnion*** at the **MOHAWK ISLAND** deep spot on the August sampling event. As stratified lakes/ponds age, and as the summer progresses, oxygen typically becomes ***depleted*** in the hypolimnion (the lower layer) by the process of decomposition. Specifically, the loss of oxygen in the hypolimnion results primarily from the process of biological breakdown of organic matter (i.e.; biological organisms use oxygen to break down organic matter), both in the water column and particularly at the bottom of the lake/pond where the water meets the sediment. When oxygen levels are depleted to less than 1 mg/L in the hypolimnion **(as it was this season and in many past seasons)**, the phosphorus that is normally bound up in the sediment may be re-released into the water column.

This year the DES biologist conducted the temperature/dissolved oxygen profile in ***August.*** We recommend that the 2004 annual biologist visit to **MOHAWK ISLAND** be scheduled during ***early June*** so that we can determine if oxygen is depleted in the hypolimnion ***earlier*** in the sampling season.

- **Table 11: Turbidity**
  Table 11 (Appendix B) lists the current year and historic data for in-lake and tributary turbidity. Turbidity in the water is caused by suspended matter, such as clay, silt, and algae. Water clarity is

strongly influenced by turbidity. Please refer to the "Other Monitoring Parameters" section of this report for a more detailed explanation.

The turbidity in the **Black Brook** sample was ***slightly elevated*** on the **August** sampling event, which suggests that the stream bottom may have been disturbed while sampling or that erosion is occurring in this portion of the watershed.

When the stream bottom is disturbed, sediment, which typically contains attached phosphorus, is released into the water column. When collecting samples in the inlets, please be sure to sample where there the stream is flowing and where the stream is deep enough to collect a "clean" sample. If you are sampling from a boat, please make sure that the boat does not disturb the bottom sediment.

If you suspect that erosion is occurring in this portion of the watershed, we recommend that your monitoring group conduct stream surveys and storm event sampling along this inlet. This additional sampling may allow us to determine what is causing the elevated levels of turbidity.

For a detailed explanation on how to conduct rain event and stream surveys, please refer to the 2002 VLAP Annual Report "Special Topic Article", or contact the VLAP Coordinator.

- **Other Observations/Investigations:**
There have been several projects that DES has been involved with along the shores and within the watershed of Lake Winnisquam in 2003. These projects involve Ahern State Park in Laconia and Hueber Drive/Route 3 in Belmont.

Ahern State Park, Laconia

On December 10, 2002, Department of Environmental Services (DES) personnel met with the City of Laconia and the Ahern State Park Advisory Committee to discuss the water quality at Ahern State Park Beach. As a result of that meeting, DES developed and carried out a water quality monitoring plan for Ahern State Park, both at the beach area and in the Governor Park Stream watershed in Summer 2003. The purpose of the monitoring was to identify and quantify sources of *E. coli* bacteria to the beach area.
During the Summer of 2003, DES conducted a sanitary survey of the Governor Park Stream watershed. In addition, DES conducted multiple rounds of dry weather and wet weather sampling. Potential bacteria sources were identified, documented, and mapped.

Sources of *E. coli* bacteria originating from the Lakes Region Correctional Facility grounds is the probable cause of water quality standard violations at Ahern State Park Beach and in Governor Park Stream during and immediately after stormwater runoff events. The primary suspected source is leakage and exfiltration from old clay sewer pipes. Photo 1 shows the Governor Park Stream discharge during a storm event on July 16, 2003.

Photo 1: Stormwater discharge from Governor Park Stream to Lake Winnisquam at Ahern State Park Beach

Hueber Drive, Belmont

A pond which directly discharges to Lake Winnisquam is located adjacent to the railroad tracks north of Dutile Shores Road. Due to runoff within the Huber Drive Brook subwatershed, sediment is transported through the pond and is discharged into the Lake. Photo 2 shows the pond which receives the sediment-laden runoff prior to discharging to the Lake.

Photo 2: Pond located near the railroad tracks north of Dutile Road

Although the sediment is being generated by numerous sources, the New Hampshire Department of Transportation (DOT) has agreed to work with DES to find a solution to correct the water quality violation. During the

Summer of 2003, DES met with representatives of DOT to discuss potential design solutions. DOT is in the process of designing a stormwater treatment area near Hueber Drive. The design will be incorporated into the second phase of the Route 3 reconstruction in Belmont.

DATA QUALITY ASSURANCE AND CONTROL

Annual Assessment Audit:

During the annual visit to your lake/pond, the biologist conducted a "Sampling Procedures Assessment Audit" for your monitoring group. Specifically, the biologist observed the performance of your monitoring group while sampling and filled out an assessment audit sheet to document the ability of the volunteer monitors to follow the proper field sampling procedures (as outlined in the VLAP Monitor's Field Manual). This assessment is used to identify any aspects of sample collection in which volunteer monitors are not following the proper procedures, and also provides an opportunity for the biologist to retrain the volunteer monitors as necessary. This will ultimately ensure that the samples that the volunteer monitors collect are truly representative of actual lake and tributary conditions.

Overall, each monitoring group did an ***excellent*** job collecting samples on the annual biologist visit this season! Specifically, the members of your monitoring group followed the proper field sampling procedures and there was no need for the biologist to provide additional training. Keep up the good work!

Sample Receipt Checklist:

Each time your monitoring group dropped off samples at the laboratory this summer, the laboratory staff completed a sample receipt checklist to assess and document if the volunteer monitors followed proper sampling techniques when collecting the samples. The purpose of the sample receipt checklist is to minimize, and hopefully eliminate, future re-occurrences of improper sampling techniques.

Overall, the sample receipt checklist showed that the **POT ISLAND** monitoring group did an ***excellent*** job when collecting samples and submitting them to the laboratory this season! Specifically, the members of your monitoring group followed the proper field sampling procedures and there was no need for the laboratory staff to contact your group with questions, and no samples were rejected for analysis.

We encourage the **MOHAWK ISLAND** and **THREE ISLANDS** monitoring groups to sample on their own in addition to the annual biologist visit next season. ***Please contact the VLAP Coordinator soon to schedule your annual visit in June. It would be a good idea to refresh your sampling skills with the biologist before sampling on your own.***

NOTES

MOHAWK ISLAND

- **Monitor's Note (8/28/03):** Windy conditions and drifting made it difficult to view the Secchi disk

THREE ISLANDS

- **Monitor's Note (8/29/03):** It was harder to view the Secchi disk today due to the chop and glare

USEFUL RESOURCES

Best Management Practices to Control Nonpoint Source Pollution: A Guide for Citizens and Town Officials, *NHDES-WD 97-8*, NHDES Booklet, (603) 271-3503.

Comprehensive Shoreland Protection Act, RSA 483-B, WD-SP-5, NHDES Fact Sheet, (603) 271-3503 or www.des.state.nh.us/factsheets/sp/sp-5.htm.

Cyanobacteria in New Hampshire Waters Potential Dangers of Blue-Green Algae Blooms, NHDES Fact Sheet, (603) 271-3505, or www.des.state.nh.us/factsheets/wmb/wmb-10.htm.

Erosion Control for Construction in the Protected Shoreland Buffer Zone, WD-SP-1, NHDES Fact Sheet, (603) 271-3503 or www.des.state.nh.us/factsheets/sp/sp-1.htm

Impacts of Development Upon Stormwater Runoff, WD-WQE-7, NHDES Fact Sheet, (603) 271-3503, or www.des.state.nh.us/factsheets/wqe/wqe-7.htm

Lake Protection Tips: Some Do's and Don'ts for Maintaining Healthy Lakes, *WD-BB-9*, NHDES Fact Sheet, (603) 271-3503 or www.des.state.nh.us/factsheets/bb/bb-9.htm.

Road Salt and Water Quality, WD-WMB-4, NHDES Fact Sheet, (603) 271-3503 or www.des.state.nh.us/factsheets/wmb/wmb-4.htm.

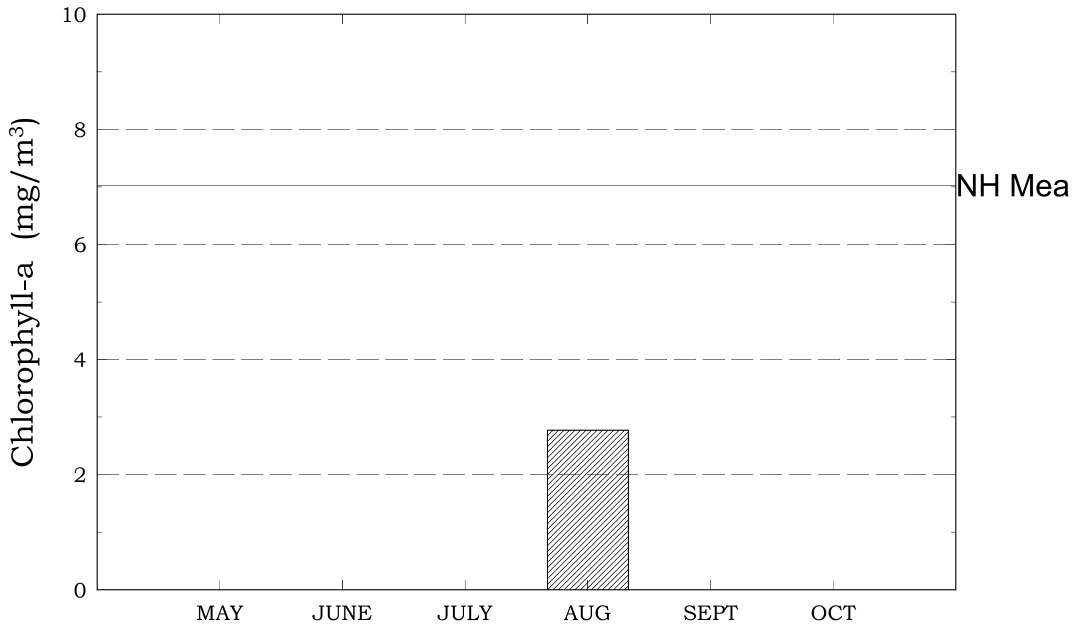
Sand Dumping - Beach Construction, *WD-BB-15*, NHDES Fact Sheet, (603) 271-3503 or www.des.state.nh.us/factsheets/bb/bb-15.htm.

APPENDIX A

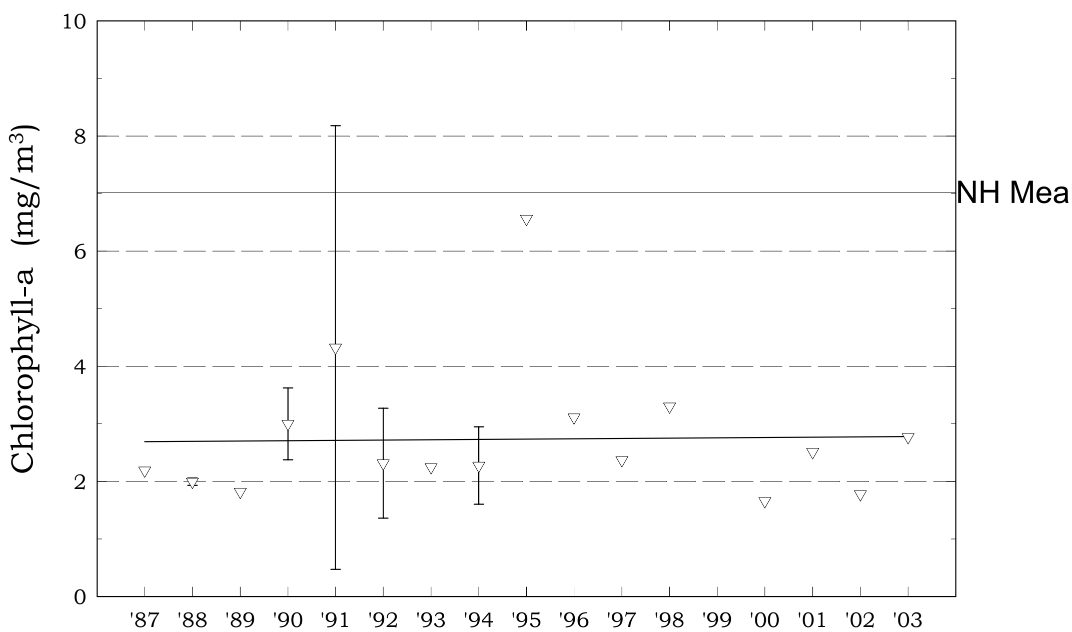
GRAPHS

Lake Winnisquam, Mohawk Isl.

Figure 1. Monthly and Historical Chlorophyll-a Results



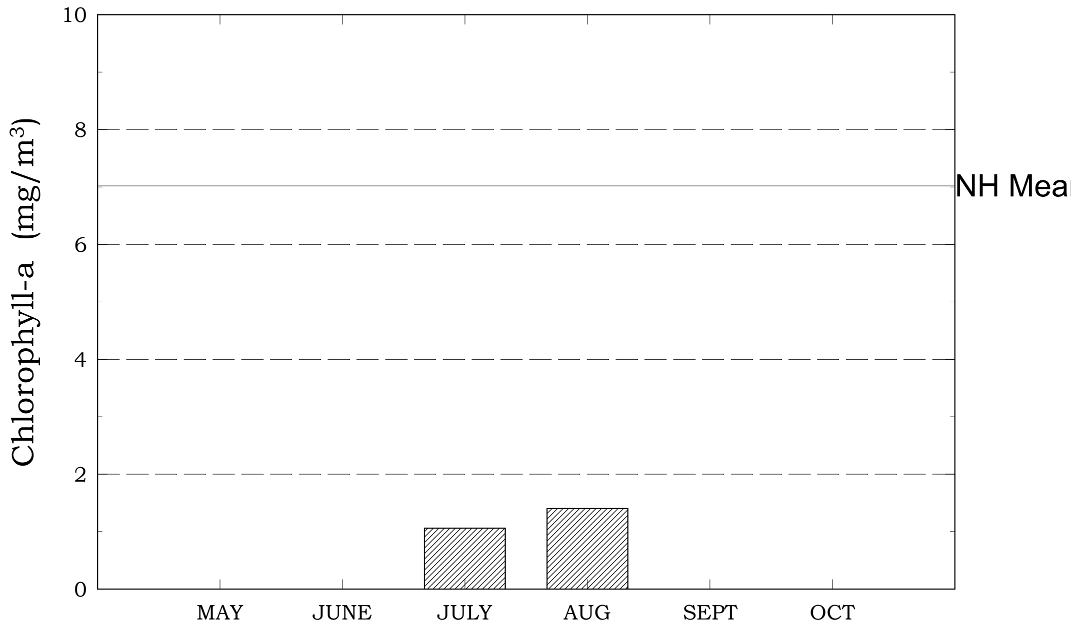
2003 Chlorophyll-a Results



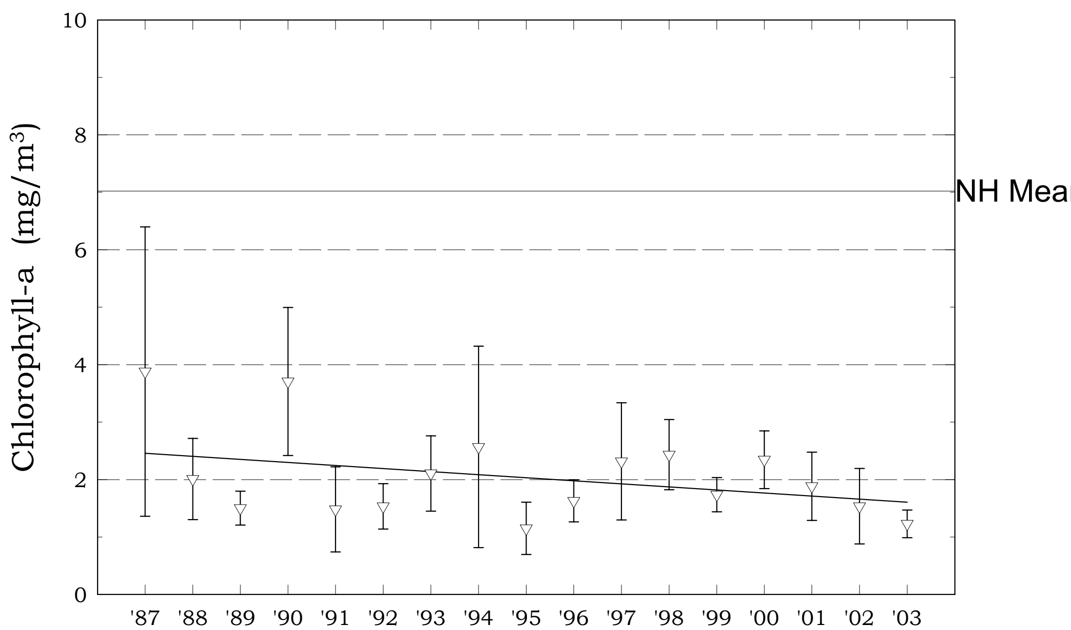
Historical Chlorophyll-a Results

Lake Winnisquam, Pot Isl.

Figure 1. Monthly and Historical Chlorophyll-a Results



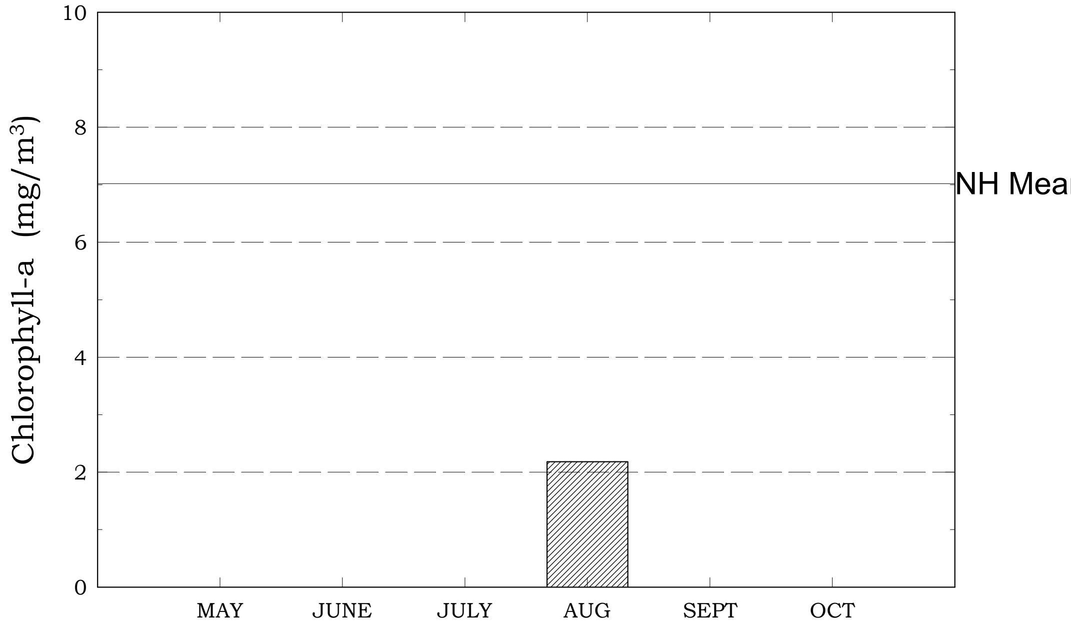
2003 Chlorophyll-a Results



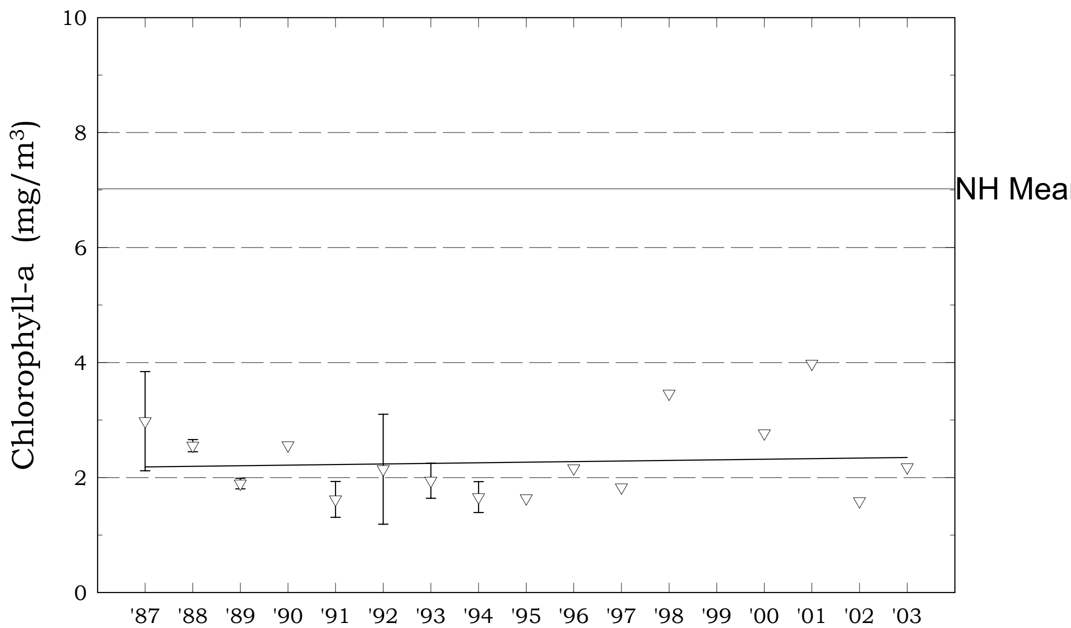
Historical Chlorophyll-a Results

Lake Winnisquam, Three Isl.

Figure 1. Monthly and Historical Chlorophyll-a Results



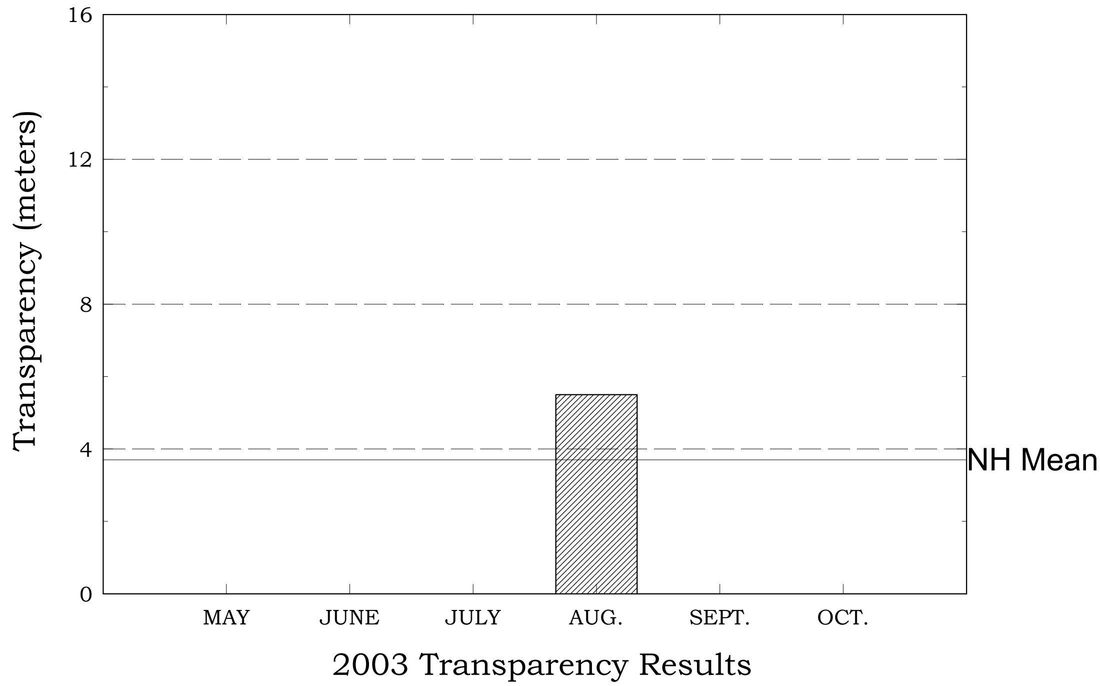
2003 Chlorophyll-a Results

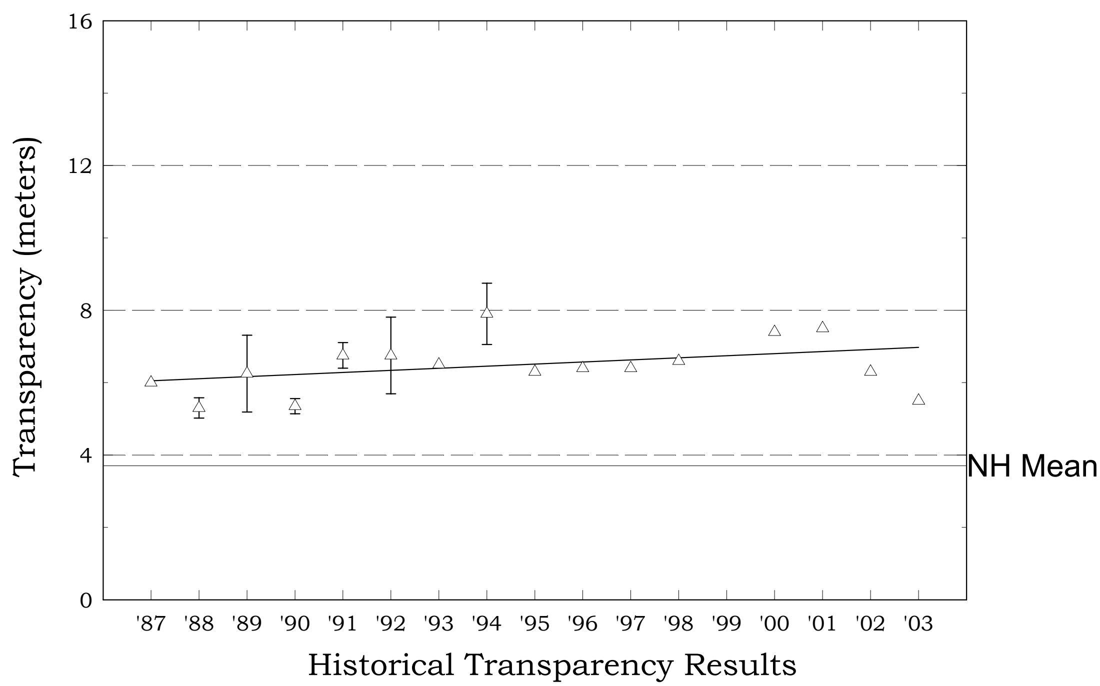


Historical Chlorophyll-a Results

Lake Winnisquam, Mohawk Isl.

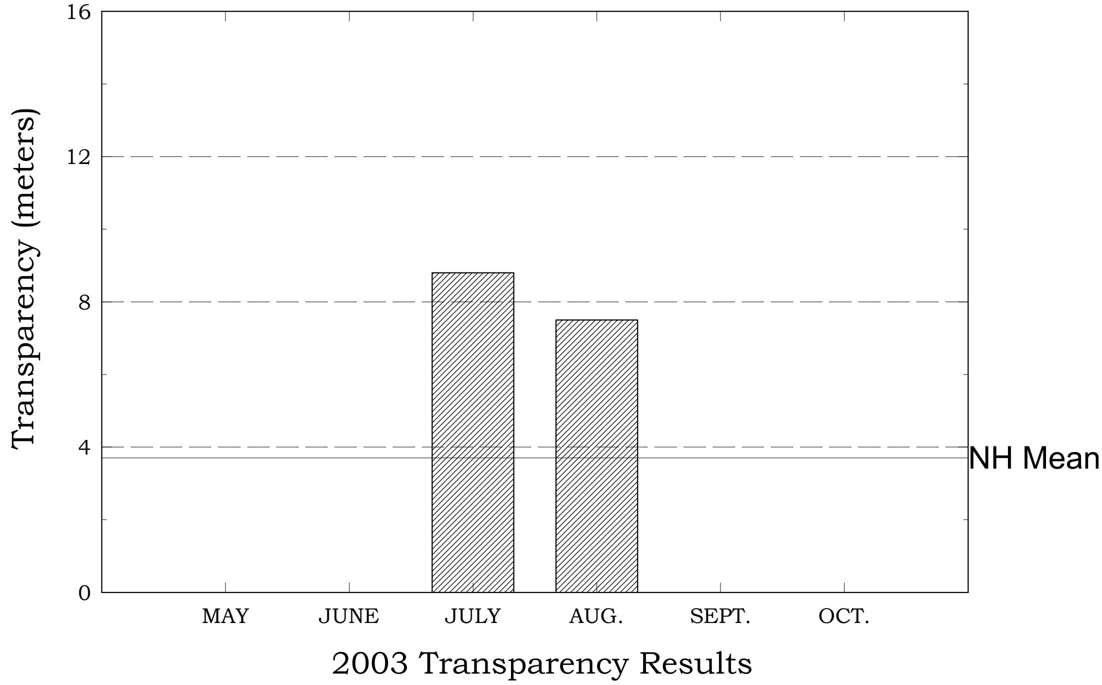
Figure 2. Monthly and Historical Transparency Results

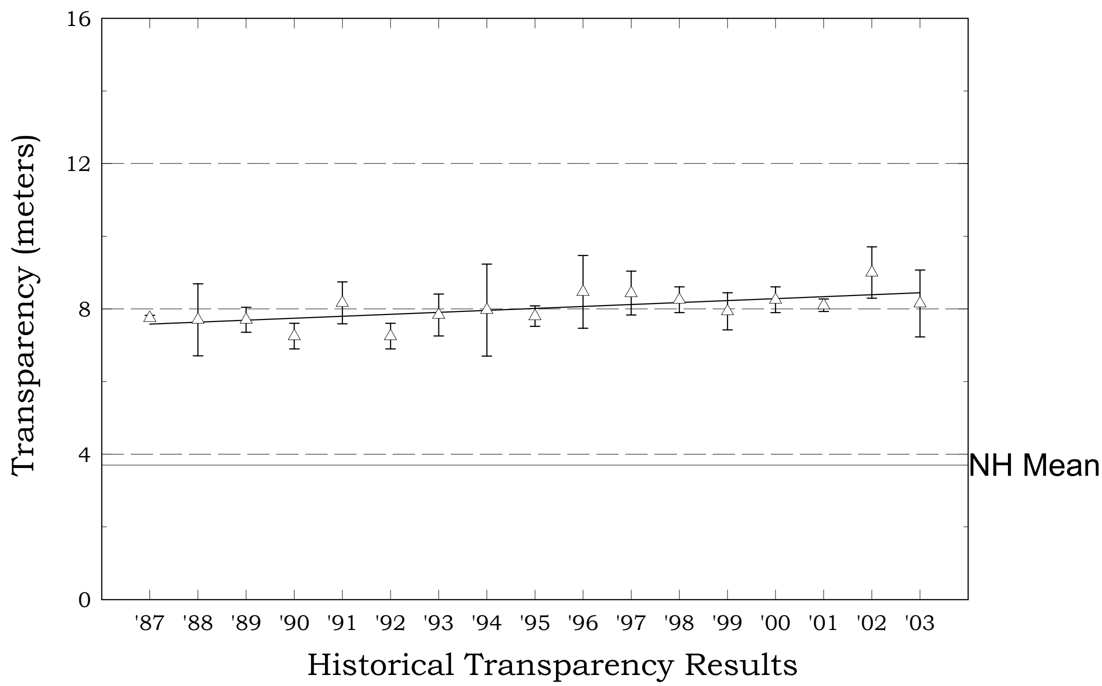




Lake Winnisquam, Pot Isl.

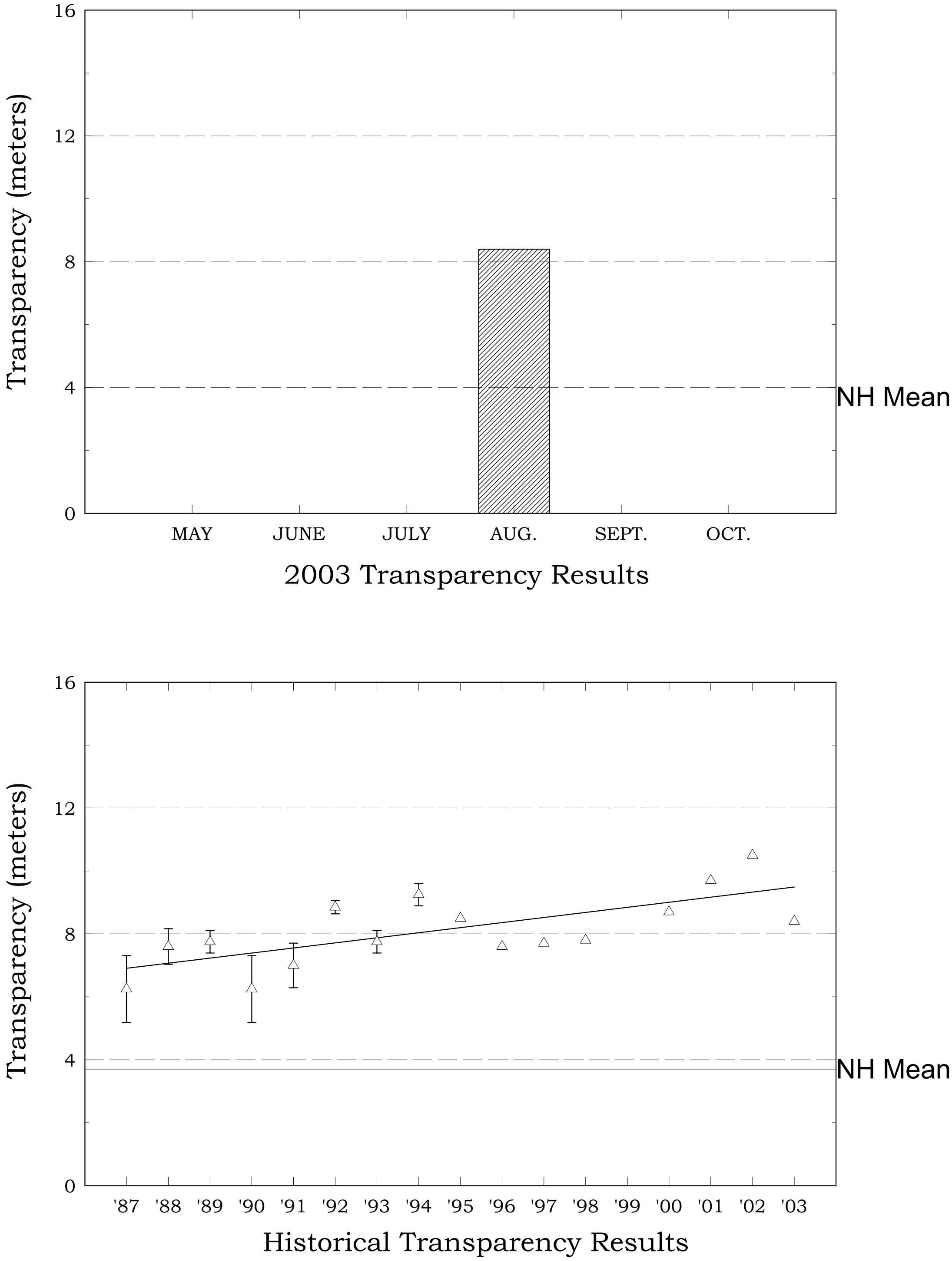
Figure 2. Monthly and Historical Transparency Results





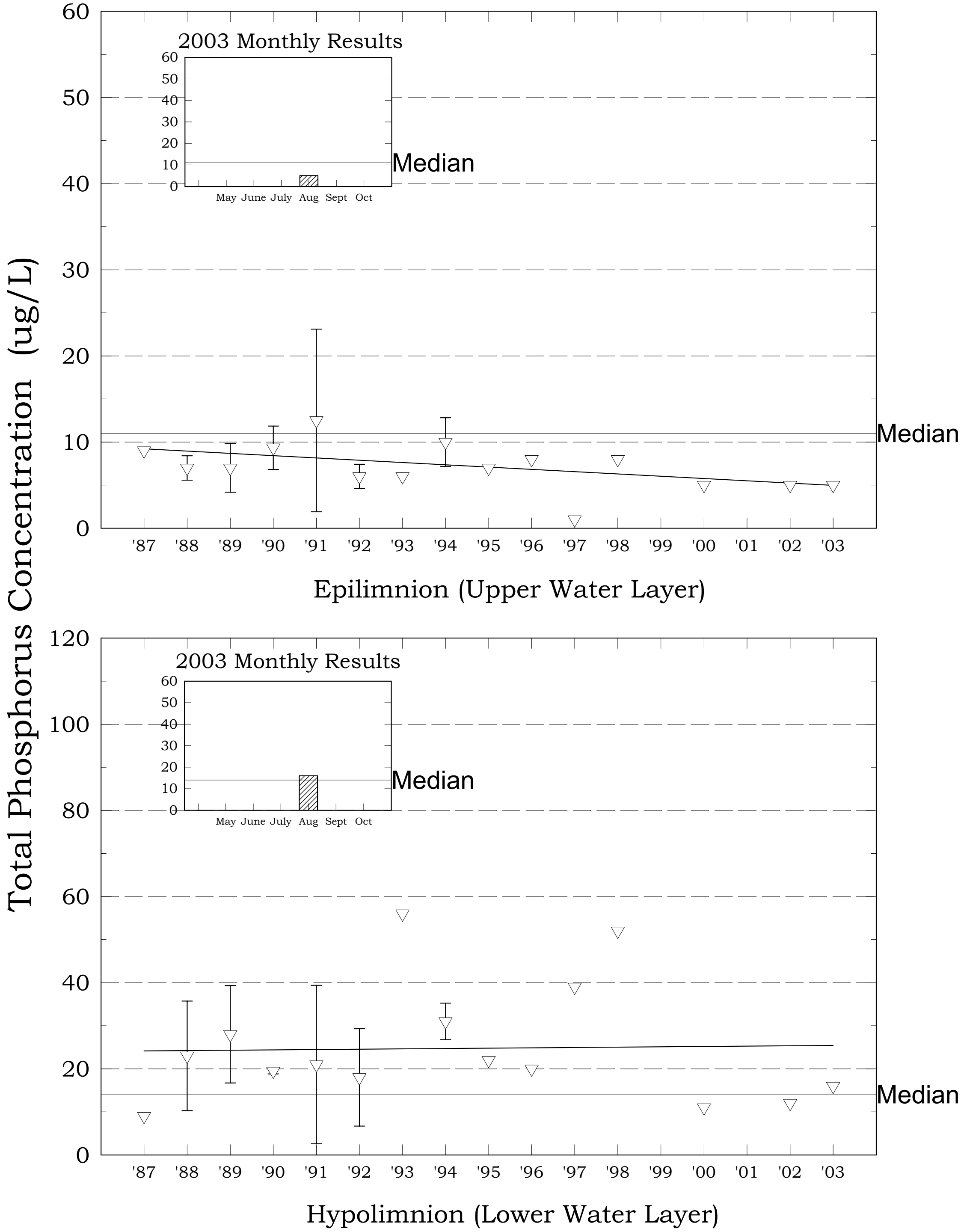
Lake Winnisquam, Three Isl.

Figure 2. Monthly and Historical Transparency Results



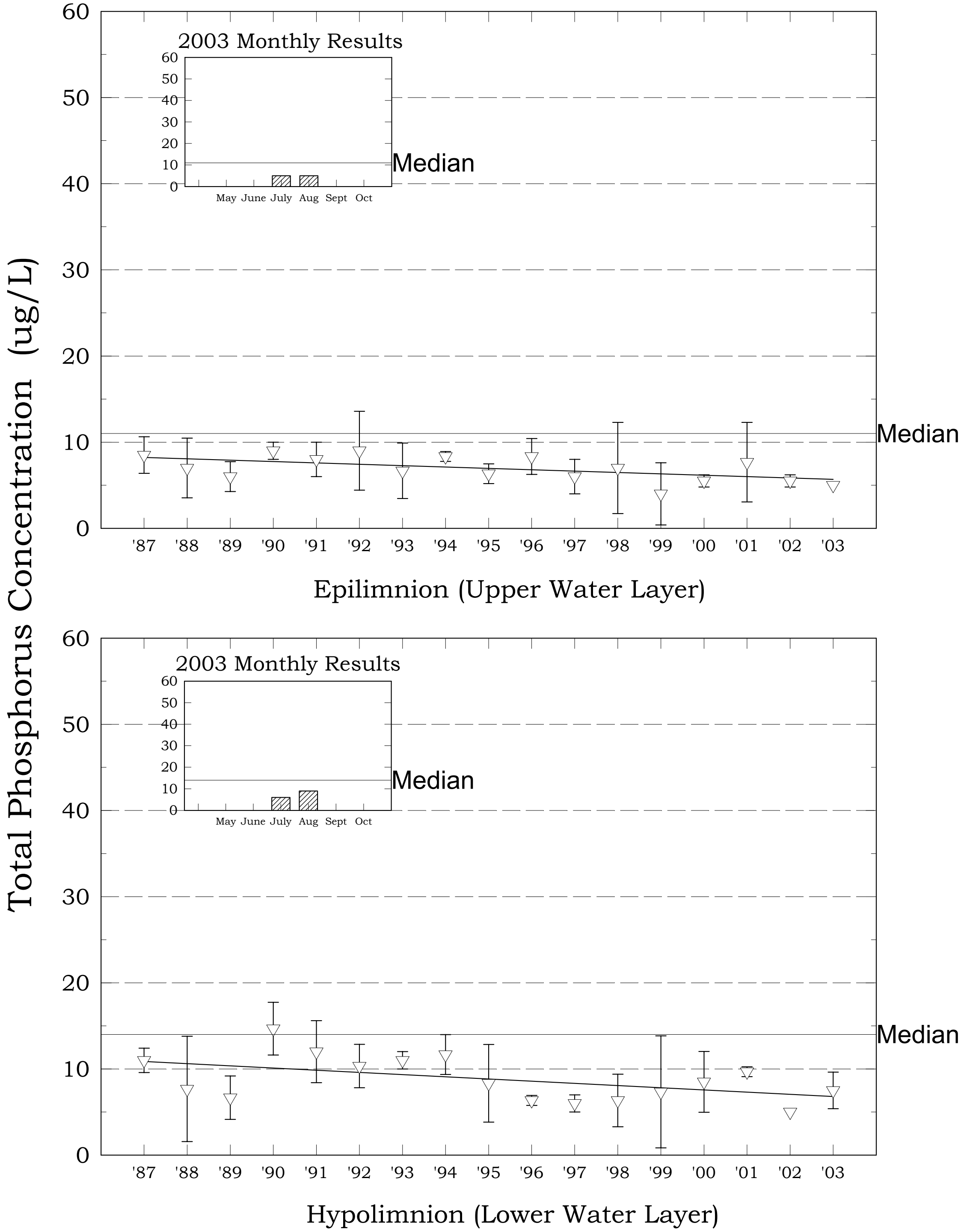
Lake Winnisquam, Mohawk Isl.

Figure 3. Monthly and Historical Total Phosphorus Data.



Lake Winnisquam, Pot Isl.

Figure 3. Monthly and Historical Total Phosphorus Data.



Lake Winnisquam, Three Isl.

Figure 3. Monthly and Historical Total Phosphorus Data.